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**From:** Poeske, Regina [Poeske.Regina@epa.gov]  
**Sent:** 10/17/2018 2:55:49 PM  
**To:** Wilson, Jennifer [wilson.jenniferA@epa.gov]  
**Subject:** FW: Washington Works Stack Testing  
**Attachments:** Dry Ice Six Impinger Modified Method 18 Procedure for Sampling Fluoroeth....pdf; HFPO-DA Method 0010 - Sampling Train Breakthrough Percentages with Graph....pdf

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**From:** Durham, William F [mailto:William.F.Durham@wv.gov]  
**Sent:** Tuesday, October 09, 2018 9:00 AM  
**To:** Poeske, Regina <Poeske.Regina@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>  
**Subject:** FW: Washington Works Stack Testing

WVDAQ team is reviewing this...

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**From:** Canterbury, Jason <Jason.Canterbury@Chemours.Com>  
**Sent:** Friday, October 5, 2018 9:15 AM  
**To:** Durham, William F <William.F.Durham@wv.gov>  
**Cc:** Fehrenbacher, Robert J <robert.j.fehrenbacher@chemours.com>; Mentink, John J <JOHN.J.MENTINK@chemours.com>; Mandirola, Scott G <Scott.G.Mandirola@wv.gov>; Fenton, Richard W <Richard.W.Fenton@wv.gov>; Johnson, Rebecca H <Rebecca.H.Johnson@wv.gov>; Egnor, Michael <Michael.Egnor@wv.gov>; Regina Hendrix <regina.hendrix@comcast.net>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Crane, Alison A <Alison.A.Crane@chemours.com>; Vickery, Richard S <RICHARD.S.VICKERY-1@chemours.com>  
**Subject:** RE: Washington Works Stack Testing

Fred,

So sorry for the delay in response....Please see my comments below in red. Also, the attached documents will help answer June/July 2018 question #5, and August 2018 question #4.

Have a great weekend!

Regards,

Jason

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**From:** Durham, William F [mailto:William.F.Durham@wv.gov]  
**Sent:** Friday, September 21, 2018 10:37 AM  
**To:** Canterbury, Jason <Jason.Canterbury@Chemours.Com>  
**Cc:** Fehrenbacher, Robert J <robert.j.fehrenbacher@chemours.com>; Mentink, John J <JOHN.J.MENTINK@chemours.com>; Mandirola, Scott G <Scott.G.Mandirola@wv.gov>; Fenton, Richard W <Richard.W.Fenton@wv.gov>; Johnson, Rebecca H <Rebecca.H.Johnson@wv.gov>; Egnor, Michael <Michael.Egnor@wv.gov>; Regina Hendrix <regina.hendrix@comcast.net>; Buckley, Timothy <Buckley.Timothy@epa.gov>  
**Subject:** Washington Works Stack Testing

Jason:

As we have discussed via phone, Chemours has engaged in targeted stack testing for certain PFAS compounds and plans for future tests. Additionally, the company has agreed to provide selected samples to EPA ORD. The primary purpose of this email is to initiate that selection process and begin preparations for the upcoming stack tests.

**For testing conducted in June/July 2018.**

- 1) The stated purpose of the test was to determine the removal efficiency of C3 Dimer Acid (HFPO-DA) by three different scrubbers. **Correct**
- 2) The three process scrubbers were identified as FEP, PFA and PTFE. What is the emission point ID for each scrubber, as identified in the Title V Operating Permit R30-10700182-2016 (Part 2 of 14) MM01? Which emission units are controlled by each scrubber, using the Title V Emission Unit ID as its identifier?  
**Per Title V Operating Permit R30-10700182-2016 (Part 2 of 14) MM01,**

**FEP (C2 Area) Emission Point ID C2DTE, Emission Unit ID C2DW (Dryer #1, controlled by C2DWC1 – Bagfilter, C2DWC2 – Scrubber, and C2DTC3 – Deep Bed Scrubber), and C2EH (Dryer #2, controlled by C2EHC1 – Bagfilter, C2EHC2 – Deep Bed Scrubber, and C2DTC3 – Deep Bed Scrubber).**

**PFA (C1 Area) Emission Point ID C1FSE, Emission Unit ID C1FS (Dryer, controlled by C1FSC1 – Baghouse, C1FSC2 – Scrubber, and C1FSC3 – Deep Bed Scrubber.**

**PTFE, Fine Powder/Finishing (T6 Area) Emission Point ID T6IZCE (Dryer #1, 2, and 3, controlled by T6IFC – Packed Bed Scrubber, and T6IZC – Deep Bed Scrubber.**

- 3) Was the sampling conducted using the method (EPA Method 0010) as identified in the partial test protocol provided on 8/13/2018 (IASDATA\Chemours\15418.002.001\Emissions Test Protocol Non-Confidential-LW)? What modifications were made to the method and/or what additional methods were used?  
**The sampling for the HFPO-DA was conducted using a Modified Method 0010 sampling train. The train was equipped with an additional XAD-2 resin trap behind the Condensate Impinger section of the sampling train. The additional XAD-2 resin trap was extracted and analyzed separately to provide an indicator of analyte breakthrough from the train components. The rinsing solvent used during sampling train breakdown was a methanol solution containing 5% NH<sub>4</sub>OH. All of the sampling train glass components were thoroughly rinsed using this solvent system. The rinses were composited with their attendant sampling train fractions in the laboratory during sample preparation for analysis.**
- 4) Was the analysis of the samples conducted as stated in the “TestAmerica HFPO-DA Method 0010 Sampling Train Fraction Preparation and Analysis Summary” provided as part of the partial test protocol on 8/13/2018? If not, what modifications were made?  
**The Method 0010 sample analysis followed the standard TestAmerica HFPO-DA analysis, with the following modifications. Samples that exceeded the analytical method calibration curve required dilutions, and sometimes dilutions that were very large. Dilutions that required re-preparations were post spiked with IDA to track the accuracy of the dilution process.**
- 5) The Summary describes four sample train fractions, Front-Half Composite, Back-Half Composite, Condensate and Impinger Contents, and Breakthrough XAD-2 Resin Tube. Was breakthrough considered a problem for any of the samples collected? For the other three fractions, what was the average percentage of total measured HFPO-DA found within each fraction? Please provide the information specific for each scrubber and also identified as an inlet sample or outlet sample.  
**A table displaying each of the Chemours processes and their sampling runs with the distribution of HFPO-DA in each sample fraction is provided.**
- 6) Was the test able to provide information on scrubber efficiency for HFPO-DA? If so, what is the efficiency of each scrubber?

Yes and No. FEP area did not have inlet ports installed yet on the scrubber train, so no efficiency calculated. Efficiencies were calculated in PTFE and PFA. PTFE scrubber efficiency ~ 99.6% removal efficiency. PFA ~70.1 % efficiency.

- 7) Was the purpose of the June/July test expanded? If so, what additional purpose was sought?  
Additional purpose was to quantify HFPA-DA at each location tested.
- 8) Were additional sampling methods employed? If so, what were they?  
The additional sampling methods employed were EPA Methods 1 through 4. Velocity was evaluated from differential pressure measurements using a stainless steel Type-S pitot tube and oil manometer in accordance with EPA Methods 1 and 2. Note that due to limited access to some of the test ports a complete Method 1 traverse was not conducted during the Method 0010 sampling. Oxygen and carbon dioxide measurements were conducted using a Fyrite apparatus in accordance with EPA Method 3. Moisture content of the Method 0010 sample trains were determined in accordance with EPA Method 4.
- 9) Did the analysis seek to identify additional compounds? If so, what were they? Were they considered in the scrubber efficiency determinations?  
Exhaust Gas Conditions, i.e. Temperature, Moisture, Oxygen, and Carbon Dioxide and Volumetric Flow Rates.

**For testing conducted in August 2018. - This is the highest priority and Chemours should focus on providing answers to these questions ASAP so that we may identify samples for ORD analysis.**

- 1) The stated purpose of the test was to determine the removal efficiency of C3 Dimer Acid (HFPO-DA) by two different scrubbers, and to identify if HFPO-DA, Perfluorinated Octanoic Acid (PFOA) and Fluoroether (E-1) are emitted by various equipment. Correct
- 2) Please identify the emission point ID for each of the units tested.  
PFA (C1 Area) Emission Point ID C1FSE, Emission Unit ID C1FS (Dryer, controlled by C1FSC1 – Baghouse, C1FSC2 – Scrubber, and C1FSC3 – Deep Bed Scrubber. Inlet to scrubber has no EPID).

PTFE, Fine Powder/Finishing (T6 Area) Emission Point ID T6IZCE (Dryer #1, 2, and 3, controlled by T6IFC – Packed Bed Scrubber, and T6IZC – Deep Bed Scrubber. Inlet to scrubber has no EPID).

FEP (C2 Area) L3 Coagulator Bag Filter Vent To Atmosphere Emission Point ID C2DSE (controlled by Bag Filter C2DSC).

PTFE Recovery, Building 124 Tank Vent to Atmosphere (In permit as an “insignificant source”)

PTFE, Dispersion (T6 Area) Storage Tanks/GX Blend Tank Vent Emission Point ID T6PGE.

- 3) For HFPO-DA and PFOA, was the sampling conducted using the method (EPA Method 0010) as identified in the partial test protocol provided on 8/13/2018 (IASDATA\Chemours\15418.002.001\Emissions Test Protocol Non-Confidential-LW)?  
What modifications were made to the method and/or what additional methods were used? The Method 0010 sample analysis followed the standard TestAmerica HFPO-DA analysis, with the following modifications. Samples that exceeded the analytical method calibration curve required dilutions, and sometimes dilutions that were very large. Dilutions that required re-preparations were post spiked with IDA to track the accuracy of the dilution process.
- 4) For E1, please provide a sampling protocol and expected concentrations. How many sample fractions were obtained during each sampling run? A Modified Method 18 Midget Impinger Sampling Train was used to collect samples from several locations for Fluoroether E-1. The expected concentrations in each of the six (6)

impinger fractions were unknown at the time of sampling. A "Draft" of the Chemours sampling and analysis E-1 procedure is attached.

- 5) For HFPO-DA and PFOA , was the analysis of the samples conducted as stated in the "TestAmerica HFPO-DA Method 0010 Sampling Train Fraction Preparation and Analysis Summary" provided as part of the partial test protocol on 8/13/2018?

What modifications were made to the method and/or what additional methods were used?

Please see question #3 response above.

- 6) For E1, please provide an analysis protocol and expected concentrations.

Please see question #4 response above.

- 7) Who should be the primary contact for identification and shipment of samples to be analyzed by EPA ORD?

Please use the contact information below for shipment of sample extracts to EPA ORD:

**WILLIAM C. ANDERSON, PhD**  
Senior Analytical Project Manager

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING

5815 Middlebrook Pike  
Knoxville, TN 37921  
Tel (865) 291-3080 | Fax (865) 584-4315

- 8) Upon completion of the analysis of samples collected, provide the emissions of HFPO-DA, PFOA, and E1 from each emission point tested. Provide the emissions in lb/hr and ton/yr as actual and potential emissions. Provide example calculations used in determining the emission in lb/hr and ton/yr.

Area	Point Source Location	Components Tested	August 2018 (lb/hr)	(ton/yr)
FP	Packed Bed Scrubber Inlet	C3 Dimer Acid	4	15.89388
		PFOA	0.000456	0.001814
		E-1	>0.211986	>0.842321
FP	Deep Bed Scrubber Vent to Atm.	C3 Dimer Acid	0.008732	0.0347
		PFOA	0.000031	0.000127
		E-1	>0.130936	>0.52027
REC	B124 Tank Vent to Atm.	C3 Dimer Acid	0.000159	0.000635
		PFOA	9.1E-07	3.63E-06
FEP	L3 Coagulator Bag Filter Vent to Atm.	C3 Dimer Acid	1.00E-5	4.08E-05
		PFOA	1.00E-7	4.08E-07
		E-1	>0.207990	>0.826445
PFA	Scrubber Inlet	C3 Dimer Acid	0.386986	1.537678
		PFOA	0.000456	0.001814
		E-1	>0.207990	>0.826445
PFA	Scrubber Outlet	C3 Dimer Acid	0.000342	0.001361
		PFOA	7.99E-6	3.18E-05
		E-1	>0.062899	>0.249929
FP/D	Dispersion Storage Tk/GX Blend Tk Vent	C3 Dimer Acid	4.33E-5	0.000172
		PFOA	2.30E-7	9.07E-07

**For testing to be conducted in November 2018.**

- 1) What is the purpose of the test in November? **To obtain more data to confirm previous tests, and to obtain new data for other potential emission points.**
- 2) Identify the equipment to be tested.

FEP (C2 Area) L2 Coagulator Bag Filter Vent to Atmosphere

FEP (C2 Area) L3 Coagulator Bag Filter Vent to Atmosphere

FEP (C2 Area) L2 Water Scrubber Inlet

FEP (C2 Area) L3 Water Scrubber Inlet

FEP (C2 Area) Deep Bed Scrubber Vent to Atmosphere

PFA (C1 Area) Scrubber Inlet

PFA (C1 Area) Scrubber Outlet

Fine Powder/Dispersion (T5 Area) Storage Tank/GX Blend Tank Vent

- 3) What sampling and analysis methods will be used? Please provide protocols for each.  
**Same as provided above.**
- 4) EPA ORD is very interested having SUMMA canister sampling and would provide the canisters. What assistance is Chemours willing to provide for this sampling? Perhaps stack testing contractor could add this to their sampling tasks.  
**We would like to discuss this further with DEP-DAQ, Chemours, O'Brien & Gere, and Test America. Would you mind providing us with your availability and we'll set something up?**

We greatly appreciate Chemours' continuing assistance and cooperation in this effort.

Sincerely,  
Fred

William "Fred" Durham  
Director  
Division of Air Quality  
WV Department of Environmental Protection

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